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BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte DARYL W. HEINZERLING

Appeal 2016-007329
Application 14/172,458[1]
Technology Center 2100

Before JOSEPH L. DIXON, JUSTIN BUSCH, and
JAMES W. DEJMEK, *Administrative Patent Judges*.

DEJMEK, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellant appeals under 35 U.S.C. § 134(a) from a Non-Final Rejection of claims 1–5, 8–12, and 15–19. Claims 6, 7, 13, 14, 20, and 21 have been objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Non-Final Act. 29. We have jurisdiction over the remaining pending claims under 35 U.S.C. § 6(b). *See Ex parte Lemoine*, 46 USPQ2d 1420, 1423 (BPAI 1994) (precedential).

We affirm.

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[1] Appellant identifies The Boeing Company as the real party in interest. App. Br. 1.

STATEMENT OF THE CASE

Introduction

Appellant's claimed invention is directed "to establishing availability of a two-engine aircraft for an ETOPS [(Extended Operations)] flight, or an ETOPS flight path for a two-engine aircraft, based on an analysis of the risk of two independent engine failures during flight." Spec. ¶ 2. According to the Specification, an ETOPS flight may be divided into a plurality of phases, including a climb phase, one or more cruise phases, and a descent phase. Spec. ¶ 40. In a disclosed embodiment, the probability of a dual independent engine shutdown sequence is calculated for each of the ETOPS phases. Spec. ¶ 13. According to the Specification, by calculating the availability of a two-engine aircraft for each phase of the flight, rather than calculating the availability for the flight as a whole, a more accurate indication of actual risk may be determined. Spec. ¶ 9.

Claim 1 is representative of the subject matter on appeal and is reproduced below with the disputed limitation emphasized in *italics*:

> 1. A method of establishing availability of a two-engine aircraft for a predefined Extended Operations (ETOPS) flight, the method comprising:
>
> *calculating a probability of a dual independent engine shutdown sequence for each of a climb phase, a plurality of cruise phases including an ETOPS phase, and a descent phase into which the predefined ETOPS flight is divisible*, the dual independent engine shutdown sequence being composed of a sequence of events that for each phase includes events having respective, conditional probabilities specific to a model of the two-engine aircraft, a product of the conditional probabilities for a phase being the probability of the dual independent engine shutdown sequence for the phase;
>
> calculating a risk of the dual independent engine shutdown sequence during the predefined ETOPS flight as a function of a sum of the probabilities for the phases; and

> establishing availability of the two-engine aircraft for the predefined ETOPS flight based on the risk and a preexisting baseline, the predefined ETOPS flight having a flight path that the two-engine aircraft will follow in an instance in which the availability of the two-engine aircraft for the predefined ETOPS flight is established.

The Examiner's Rejections

1. Claims 1–5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Robert W. Simpson & Raymond A. Ausrotas, *A Review of Extended-Range Operations By Transport Aircraft*, FTL Report R87-9, Flight Transportation Laboratory, Massachusetts Institute of Technology, 1–48 (1987) ("Simpson") and Daniel M. Byrd & C. Richard Cothern, *Introduction to Risk Analysis*, 20–21 (Government Institutes 2000) ("Byrd"). Non-Final Act. 7–14.

2. Claims 8–12 and 15–19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Simpson, Byrd, and Agam et al. (US 2009/0150012 A1; June 11, 2009) ("Agam"). Non-Final Act. 14–29.

Issues on Appeal

1. Did the Examiner err in finding the combination of Simpson and Byrd teaches or suggests "calculating a probability of a dual independent engine shutdown sequence for each of a climb phase, a plurality of cruise phases including an ETOPS phase, and a descent phase into which the predefined ETOPS flight is divisible," as recited in claim 1?

2. Did the Examiner err in finding the combination of Simpson and Byrd teaches or suggests "calculating the conditional probability of the first event for each phase as a function of a product of an engine shutdown rate for and a time duration of the phase," as recited in claim 3?

3. Did the Examiner err in finding the combination of Simpson and Byrd teaches or suggests "calculating the conditional probability of the second event for each phase as a function of a projected time duration to touchdown at the destination airport or alternate airport," as recited in claim 5?

ANALYSIS[2]

Claims 1, 2, 4, 8, 9, 11, 15, 16, and 18

Appellant contends the Examiner erred in finding Simpson teaches calculating the probability of dual independent engine shutdown for each of the claimed phases on an ETOPS flight. App. Br. 7–10; Reply Br. 2–4. Although Appellant acknowledges Simpson recognizes "that certain types of risk events may be associated with phases of flight," Appellant asserts Simpson appears to calculate the risk probability for the entire flight, or only for the cruise phase. App. Br. 7 (referring to Simpson 9). In particular, Appellant argues Simpson's probability of dual-independent engine failure relies on a probability of failure during the cruise phase. App. Br. 9.

Simpson describes "a probability model . . . to compute the risk associated with the 'dual-independent engine failure' case on a 'per-flight' basis rather than a 'per-hour' basis." Simpson 9. The probability model may be presented by the following equation:

$$P_f = 2P_1P_2TY = (2P_1T) * P_2Y$$

[2] Throughout this Decision, we have considered the Appeal Brief, filed December 28, 2015 ("App. Br."); the Reply Brief, filed July 19, 2016 ("Reply Br."); the Examiner's Answer, mailed June 8, 2016 ("Ans."); and the Non-Final Office Action, mailed December 4, 2015 ("Non-Final Act."), from which this Appeal is taken.

where P1 represents the probability per hour of a single propulsion system failure in normal cruise; P2 represents the probability per hour of another single propulsion failure in cruise with one engine inoperative; T represents "an appropriate duration of flight (such as the duration of the extended range segment);" and Y represents a diversion time following the first failure. Simpson 9–10. Simpson teaches the diversion time is the duration of the flight to the nearest diversion airport after an engine failure occurs. Simpson 5–6.

The Examiner finds Simpson teaches a higher risk in certain of the ETOPS flight phases—particularly, in takeoff, landing, climb and descent operations as compared to cruise operations. Non-Final Act. 7–8 (citing Simpson 9, 17); Ans. 3. Additionally, Simpson teaches "[i]t is equally plausible to create and use measures of risk based on cycles, or flights, or departures, and to associate certain types of unsafe events with phases of flight such as takeoff and climb, or descent and landing." Simpson 9. The Examiner relies on this teaching and finds Simpson's description of T in the probability model as an *appropriate* duration of flight, *such as* the duration of an ETOPS segment to suggest the model applies to "the full set of phases of flight disclosed by Simpson." Ans. 4. Accordingly, the Examiner finds Simpson teaches, or at least suggests, a similar equation for the probability of dual-independent engine failure may be used for each phase of an ETOPS flight. Ans. 5. In order to get the overall probability of dual-independent engine failure over the course an ETOPS flight, the Examiner relies on Byrd to teach the summation of probabilities. Ans. 5 (citing Byrd 20).

Appellant asserts using the same probabilities P_1 and P_2 of Simpson for each phase would be factually wrong because those probabilities are the probabilities of engine failure during the cruise phase. Reply Br. 3.

The obviousness inquiry "not only permits, but *requires*, consideration of common knowledge and common sense." *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1367 (Fed. Cir. 2006); *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). Additionally, an obviousness analysis "may include recourse to logic, judgment, and common sense available to the person of ordinary skill that do not necessarily require explication in any reference or expert opinion." *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1329 (Fed. Cir. 2009). Indeed, logic, judgment, and common sense may supply a limitation missing from the cited art. *See Perfect Web*, 587 F.3d at 1328–33 (affirming a district court's use of common sense to supply a limitation missing from the prior art).

Here, we find it would have been within the common knowledge and skill set of an ordinary-skilled artisan to use probabilities of failure rates specific to the phase of operation as well as durations specific to the phase in calculating a probability for failure. Further, contrary to Appellant's assertion, the Examiner does not indicate that the same probabilities are applied at each phase, but rather using appropriate durations "and probabilities (P_1P_2) of each flight segment." Ans. 5. Accordingly, the Examiner finds Simpson teaches, or at least suggests, the probability of dual-independent engine failure for each phase of an ETOPS flight may be represented by the product of a probability of failure of a single propulsion system for a specific phase (e.g., P_{1p}) times the duration of that phase (T_p)

and the probability of another single propulsion system failure with one engine inoperative during the specific phase (e.g., P_{2p}) times a diversion time for the particular phase (e.g., Y_p). Ans. 5. In other words, the probability of a dual-independent engine failure per phase may be represented as:

$$P_p = (2P_{1p}T_p) * P_{2p}Y_p$$

We find the Examiner's findings are supported by a preponderance of the evidence and are not persuasively rebutted by sufficient persuasive evidence or reasoning by Appellant.

For the reasons discussed *supra*, we are unpersuaded of Examiner error. Accordingly, we sustain the Examiner's rejection of independent claim 1 and, for similar reasons, the rejection of independent claims 8 and 15, which recite similar limitations and were not argued separately. *See* App. Br. 10. Additionally, we sustain the Examiner's rejections of claims 2, 4, 9, 11, 16, and 18, which depend therefrom and were not argued separately. *See* App. Br. 10.

Claims 3, 10, and 17

Claim 3 depends from claim 1 and recites, in relevant part, "calculating the conditional probability of the first event for each phase as a function of a product of an engine shutdown rate for and a time duration of the phase."

Appellant again asserts Simpson does not disclose calculating the probability of a dual-independent engine failure for phases other than the cruise phase. App. Br. 10–11; Reply Br. 4–5. Additionally, Appellant argues the equation provided in Simpson is not "generalizable" to be applied to other phases of an ETOPS flight. App. Br. 11. To this point, Appellant asserts "[i]t is just as if not more likely that a different algorithms [sic] would be used for other phases, and with different unsafe events associated with those other phases." App. Br. 11.

As an initial matter, it is well settled that mere attorney arguments and conclusory statements, which are unsupported by factual evidence, are entitled to little probative value. *In re Geisler*, 116 F.3d 1465, 1470 (Fed. Cir. 1997); *see also In re Pearson*, 494 F.2d 1399, 1405 (CCPA 1974) (attorney argument is not evidence). Additionally, we note, contrary to Appellant's assertion, Appellant's Specification recites similar algorithms for the different phases. *See, e.g.*, Spec. ¶¶ 70, 86, 99, 113.

Further, as discussed *supra*, we agree with the Examiner that Simpson teaches, or at least suggests, calculating the probability of dual-independent engine failure for each phase of an ETOPS flight. Additionally, wherein the first event of such a failure is the failure of a first engine, Simpson teaches this is represented as a probability of failure of the first engine P_1 for the phase times a duration of the phase, T. *See* Simpson 9; Non-Final Act. 12; Ans. 6–7.

For the reasons discussed *supra*, we are unpersuaded of Examiner error. Accordingly, we sustain the Examiner's rejection of claim 3 and, for similar reasons, the rejection of claims 10 and 17, which recite similar limitations and were not argued separately. *See* App. Br. 11.

Claims 5, 12, and 19

Claim 5 depends from claim 1 and recites, in relevant part, "calculating the conditional probability of the second event for each phase as a function of a projected time duration to touchdown at the destination airport or alternate airport." The second event is the failure of a second engine after the first engine has shut down. *See* claim 5.

Appellant presents similar arguments that Simpson, as relied on by the Examiner, is restricted to the cruise phase and that the algorithm in Simpson is not "generalizable." App. Br. 11–12; Reply Br. 5–6.

For similar reasons discussed *supra*, we are unpersuaded of Examiner error. Additionally, we note the second factor in Simpson's algorithm, P_2Y (*see* Simpson 9), is a function of the probability of a second engine failing after the first engine has already failed multiplied by a diversion time (Y)—i.e., a duration to touchdown at a destination or alternate airport. *See* Simpson 5–6, 9–10; *see also* Non-Final Act. 13–14; Ans. 7.

Accordingly, we sustain the Examiner's rejection of claim 5 and, for similar reasons, the rejection of claims 12 and 19, which recite similar limitations and were not argued separately. *See* App. Br. 12.

DECISION

We affirm the Examiner's decision rejecting claims 1–5, 8–12, and 15–19.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 41.50(f).

AFFIRMED